

# **Desktop** **10GHz PC Platform Challenges**

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# Agenda

## Key Points

## Problem Statement

- Mythical 10GHz CPU
- System Performance Limits

## Solution Space

- Thermals
- EMI
- Power Delivery

# Key Points

- ✍ **Mythical 10GHz CPU's will exceed existing system limits**
- ✍ **Laws of physics dictate collaboration between system and CPU designers**
- ✍ **Cost will be a major factor in determining technology acceptance**

## Problem Statement

# Mythical 10GHz CPU

### Today

2GHz

70W (thermal power)

1.75V, 57A

6dB attenuation thru 10GHz

590 mil die, 0.18um

### Challenge

10GHz

80-140W

0.7-0.85V, 100+A

6dB attenuation thru 50GHz

450 mil die, 45-65nm

**CPU architecture choice will determine  
actual system requirements**

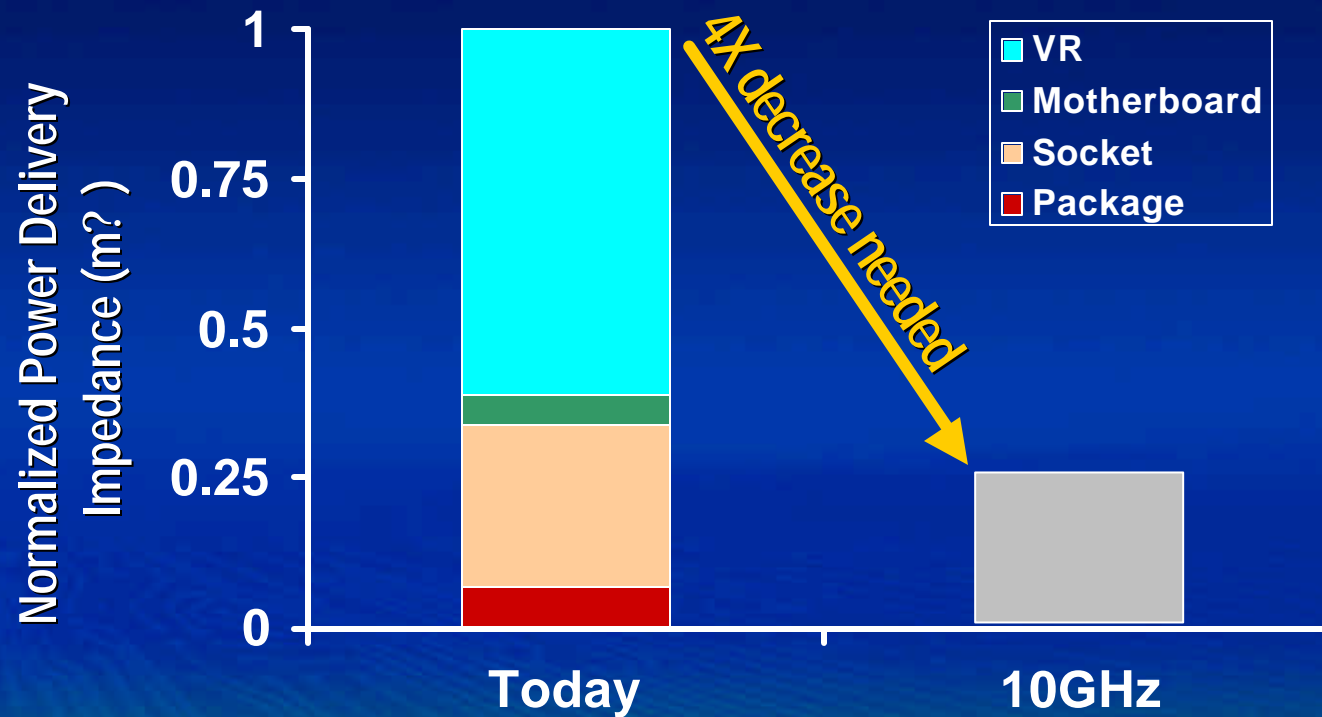
## Problem Statement

# Increase Chassis Thermal Capacity



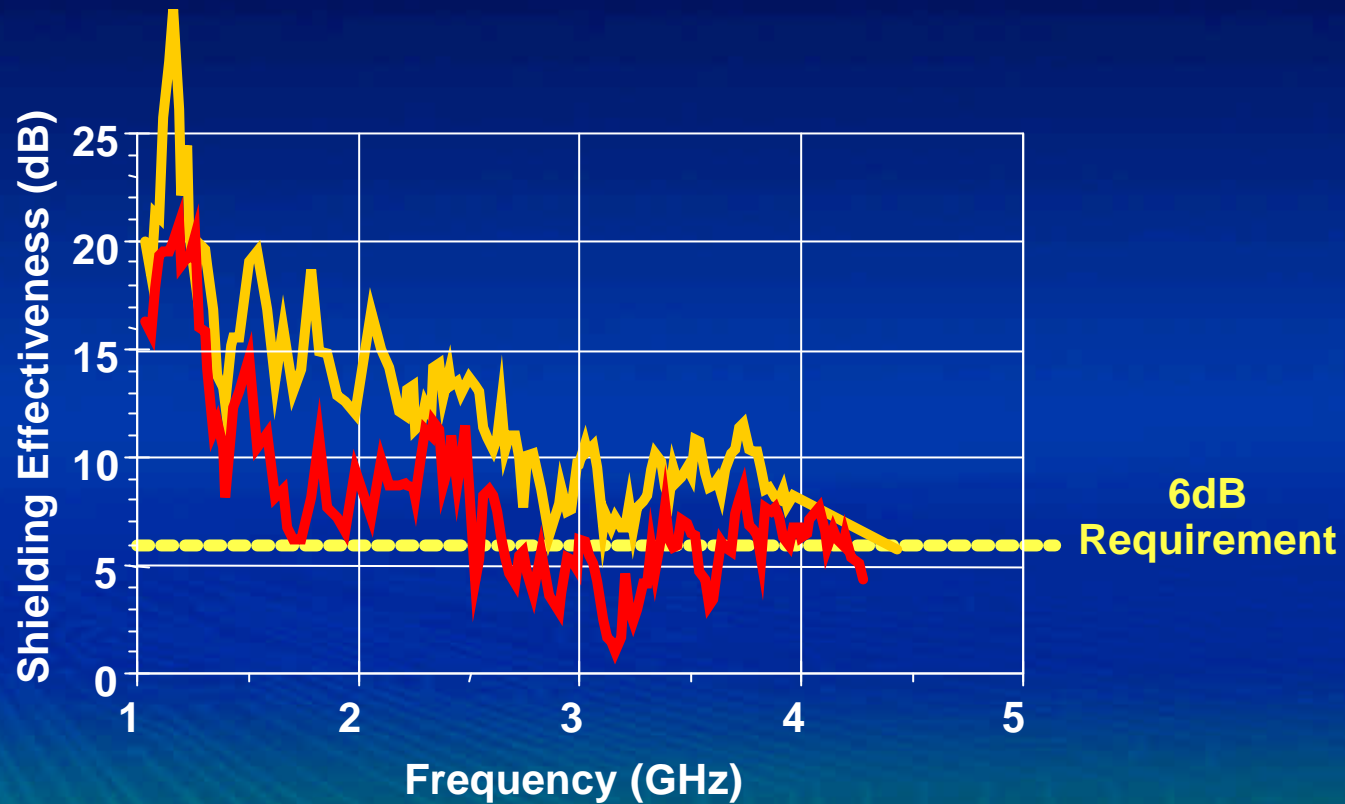
## Problem Statement

# Improve Power Distribution Network



## Problem Statement

# Improve Chassis Attenuation



# Agenda

## Key Points

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## Solution Space

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- Cost



## Solution Space

# Thermals (Airflow)

### WaveGuide Venting

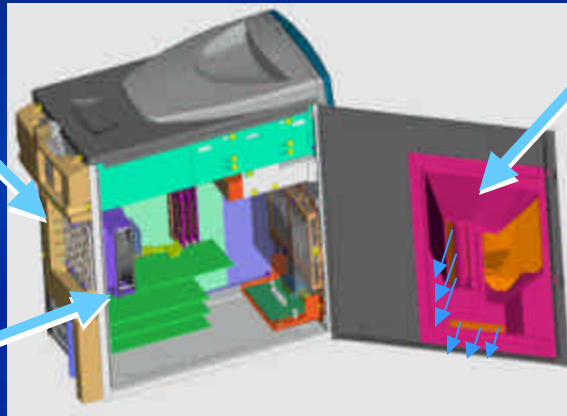
- Min pressure drop
- Depth maximizes EMI attenuation

### Vacuum Formed Duct

- Cold, high velocity air
- CPU, chipset, DRAM, graphics, voltage regulator

### Inset Fan

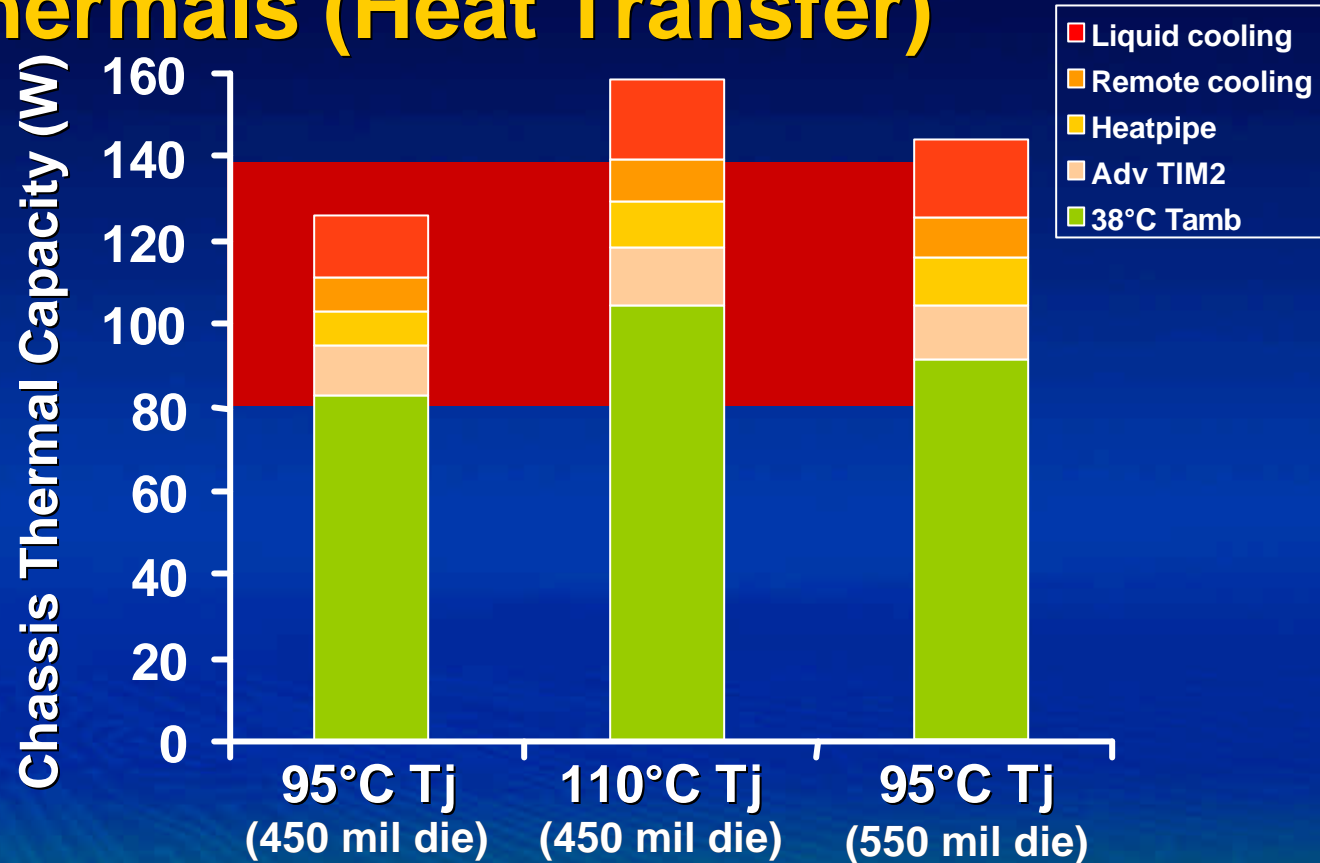
- Minimizes acoustic noise
- No “line of sight” venting



Tested at:  
31 CFM  
4.0BA/35dB  
Micro-tower

## Solution Space

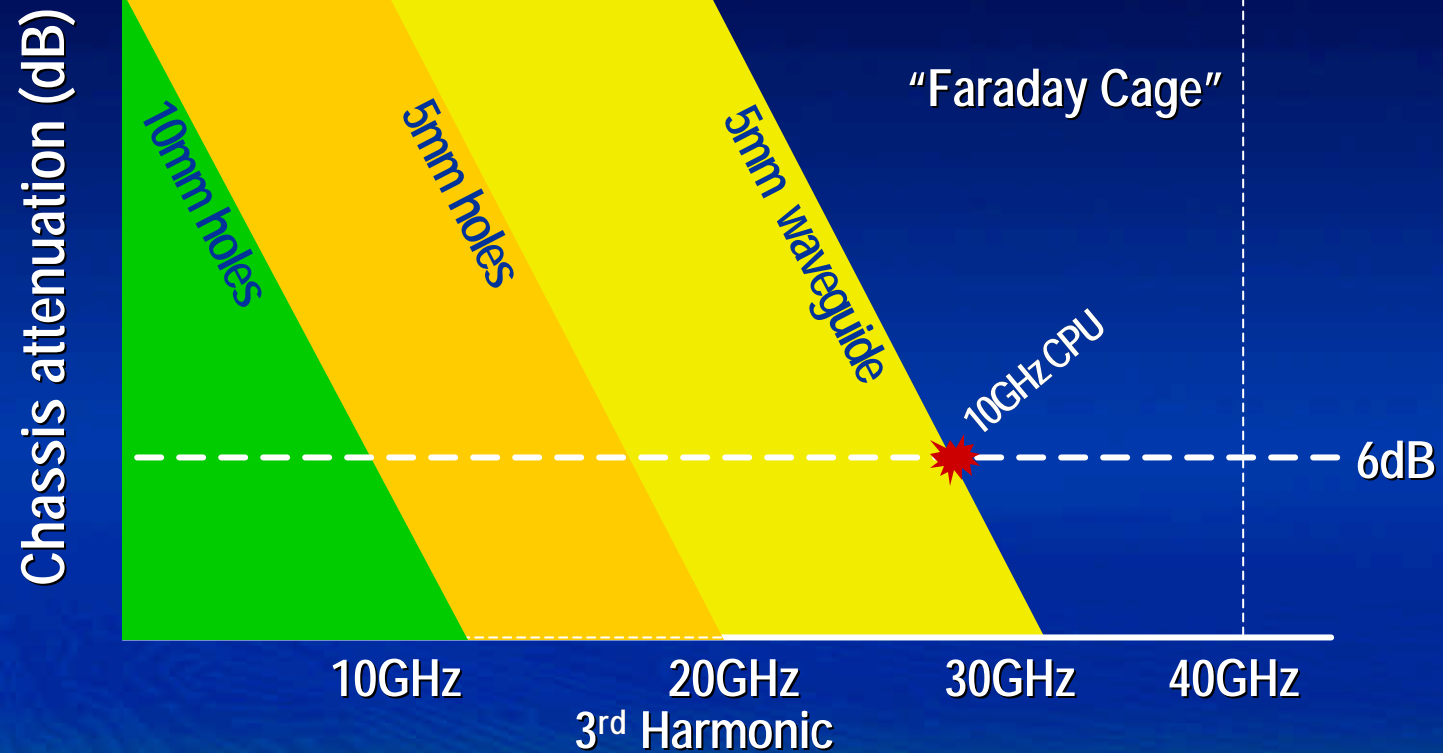
# Thermals (Heat Transfer)



CPU thermals must match system capacity

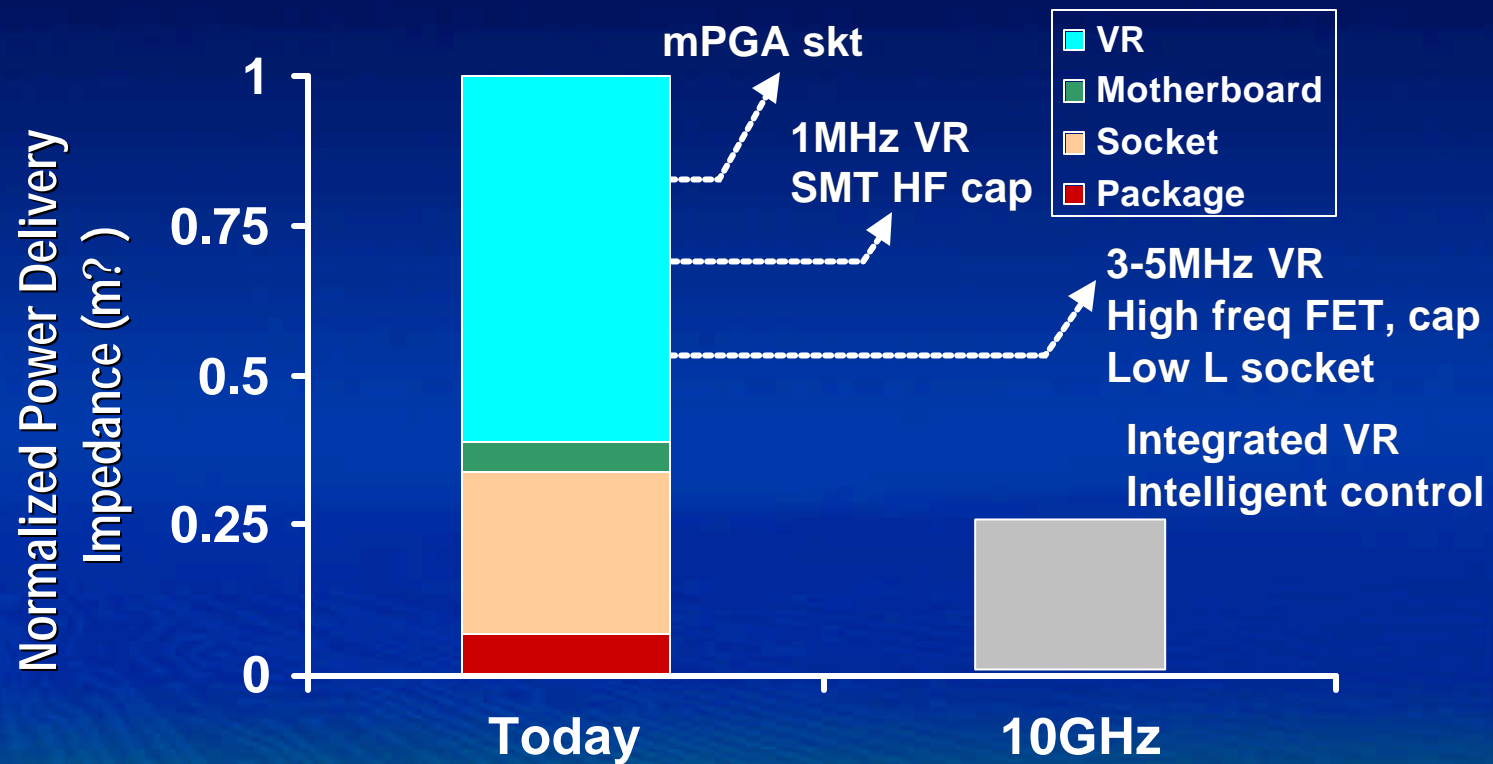
## Solution Space

## EMI



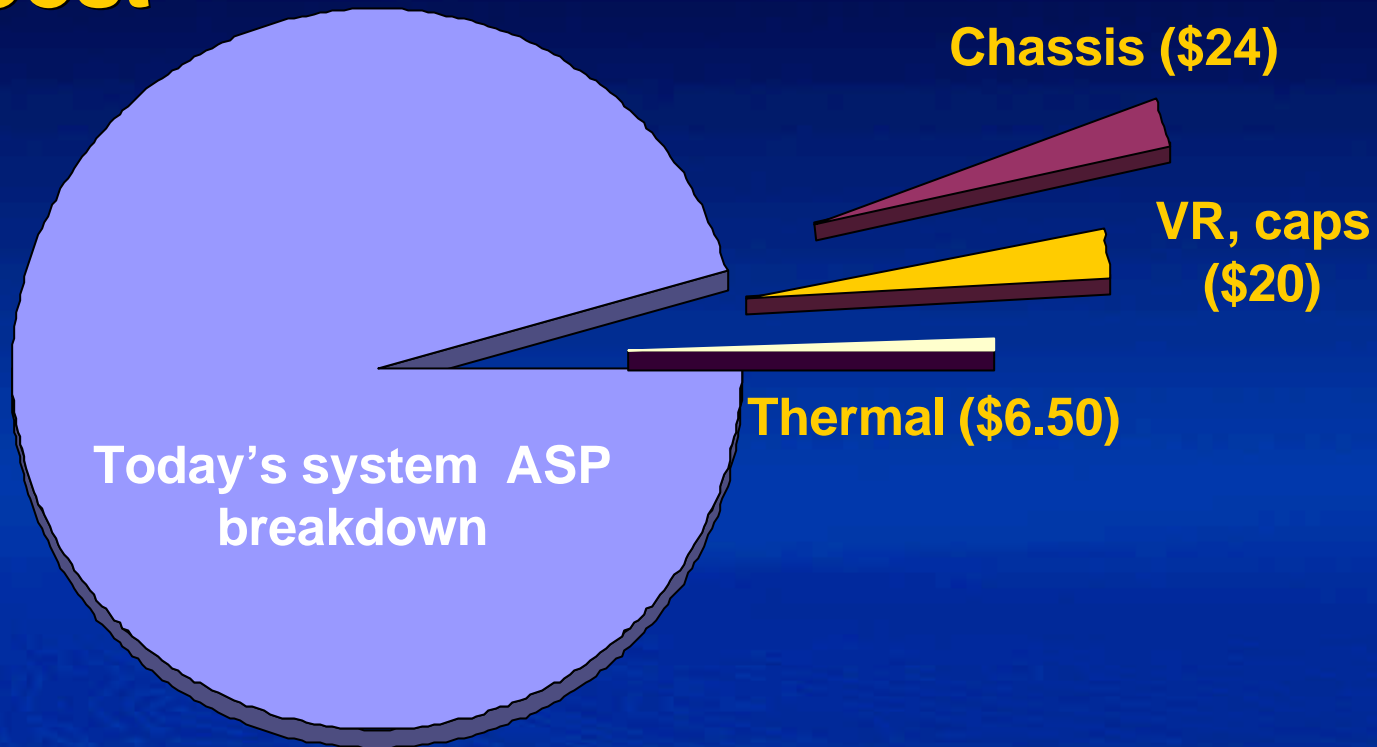
Systems must meet regulatory guidelines

## Solution Space Power Delivery



CPU power must fit within system capacity

## Solution Space Cost



Cost will be a major factor in  
determining technology acceptance

# Summary

- ✍ **10GHz poses significant system-level challenges to the industry**
- ✍ **Unless you solve everything, you haven't solved anything**
  - Requires collaboration between CPU and system designers
- ✍ **Intel, with industry partners, is leading the charge to deliver viable, complete solutions**